Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Geophysical Survey Systems, Inc.,	)	ET Docket No. 19-155
Request for Waiver of Part 15 of the	)	
Commission's Rules to Market an	)	
Ultra-Wideband Evaluation Kit	)	

COMMENTS OF THE GPS INNOVATION ALLIANCE

The GPS Innovation Alliance ("GPSIA"), pursuant to the Public Notice ("Notice") issued in the above-captioned proceeding (DA 19-491), hereby submits these comments on the Geophysical Survey Systems, Inc. ("GSSI") Request for Waiver ("Request") filed with the Commission on April 11, 2019.[1] GSSI requests waivers of several rules in Part 15 to enable it to market up to 2000 evaluation kits for an Ultra-Wideband ("UWB") ground penetrating radar ("GPR") device intended to enable self-driving cars to read features of the roadbed beneath the pavement and use this data for vehicle guidance. GPSIA recognizes the value of advances in vehicular autonomy. However, such benefits must be balanced against concerns the Commission recognized when it established rules governing protection of Global Positioning System ("GPS") Radio Navigation Satellite Service ("RNSS") signals from UWB devices. Accordingly, GPSIA suggests areas where the Commission should seek additional information from GSSI in order to make an informed decision on GSSI's Request. More broadly, due to the multiple UWB waiver-related matters that are now pending or were recently before the Commission,[2] GPSIA takes this opportunity to remind the

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1 *Geophysical Survey Systems, Inc. Request for Waiver*, ET Docket No. 19-155 (filed Apr. 11, 2019) ("Request"); *see* Public Notice, *Office of Engineering and Technology Seeks Comment on Geophysical Survey Systems, Inc. Request for Waiver of Certain Part 15 Ultra-Wideband Rules*, DA 19-491 (rel. May 30, 2019).

2 *See, e.g., Proceq USA Inc. Corrected Petition to Modify Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, (filed May 17, 2019) (hereinafter "*Corrected Proceq Request*"); *Zoll Medical Israel Ltd. Corrected Petition to Modify Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, (filed May 17, 2019) (hereinafter "*Corrected Zoll Request*"); *Massachusetts Institute of Technology Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, (filed Dec. 27, 2018); *Piper Networks*,

Commission of the importance of seeking public evaluation and input on such waiver requests, and to identify the specific minimum information the Commission should require from UWB waiver applicants in order for the Commission to effectively evaluate potential spectral compatibility issues.

I. INTRODUCTION

The GPSIA was founded in February 2013 to protect, promote, and enhance the use of GPS and Global Navigation Satellite System ("GNSS") technologies. GPS and other GNSS systems, as well as augmentations to GNSS systems, operate in frequency bands allocated to the RNSS. Members and affiliates of the GPSIA are drawn from a wide variety of fields and businesses reliant on GPS, including manufacturing, aviation, agriculture, construction, transportation, first responders, surveying, and mapping. GPSIA also includes organizations representing consumers who depend on GPS for boating and other outdoor activities and in their automobiles, smart phones, and tablets. GPSIA outlines below several concerns raised specifically by GSSI's Request and asks that the Commission require GSSI to submit additional technical information for public review in order to better assess the Request. A more thorough description of the proposed equipment and operations will enable the Commission to assess whether and to what extent a grant of a waiver is likely to result in interference to important existing services such as GPS and whether a waiver would serve the public interest. In light of the pendency of several other UWB waiver requests before the Commission, GPSIA also takes this opportunity to generally suggest a minimal set of technical parameters for consideration by the Commission for inclusion in *all* requests for waiver of the UWB rules. GPSIA offers these recommendations to enhance the efficiency of the administrative process for all parties while ensuring that the GPS industry, as well as others representing services subject to potential interference from UWB operations, have an adequate opportunity to fully consider and comment on proposed waivers of the UWB rules and their potential impact. Specifically, GPSIA requests that:

Inc. Request for Waiver of Sections 15.250(c)-(d) and 15.519(a) of the Commission's Rules, (filed June 6, 2019).

- All UWB waiver requests and requests for waiver modification should be subject to public notice and comment; and

- The Commission should require that all UWB waiver requests include certain minimum technical information enumerated below that the Commission will always require in order to assess UWB/GNSS compatibility. Waiver requests that do not include such information should not be processed unless and until the requesting party submits such information.

II. GSSI HAS NOT YET PRESENTED SUFFICIENT TECHNICAL INFORMATION TO JUSTIFY THE GRANT OF A WAIVER

The FCC may waive any provision of its rules if the petitioner demonstrates good cause for such action.[3] Pursuant to Section 1.925, a waiver may be granted if the petitioner establishes that: (1) the underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and the grant of the waiver would be in the public interest; or (2) in light of unique or unusual factual circumstances, application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative.[4] "To make this public interest determination, the waiver cannot undermine the purpose of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule."[5]

The FCC takes a conservative approach in applying these waiver standards to petitioners seeking to operate equipment co-channel with incumbent operations, placing a heavy burden on the petitioner to demonstrate how it will provide adequate protection from interference.[6] When the petitioner does not adequately demonstrate how it will avoid interference, the Commission has not acted favorably on the waiver

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3 47 C.F.R. § 1.3.

4 47 C.F.R. § 1.925.

5 *Kyma Medical Technologies Ltd. Request for Wavier of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, Order, 31 FCC Rcd. 9705, 9707 ¶ 5 (OET 2016).

6 *See, e.g., Request by Itron, Inc. for Waivers of the Commission's Rules*, Opinion, 30 FCC Rcd. 137 (Jan. 13, 2015) ("*Itron Denial*").

request.[7] As demonstrated below, GSSI has yet to provide sufficient information to support favorable Commission action. Accordingly, before proceeding, GPSIA urges the FCC to require additional information from GSSI in the areas discussed below.

GSSI's Request discusses in some detail the claimed public interest benefits of its requested waiver,[89] but, unfortunately, does not provide a similar level of detail about the technical operations of the device, making it impossible for the Commission to assess the impact of the requested waiver. GPSIA commends GSSI for having provided the necessary transmit waveform information (including frequencies, dwell times, and modulation), as well as the system's operational orientation (12 inches above ground, directed at the ground).[10] Moreover, GSSI generally provided a useful and informative description of its system. However, there are still open questions with respect to actual transmit power and maximum harmonic content. The system's harmonics are a particularly salient concern since they could potentially fall within a GNSS band. For example, the 5th harmonic of 313 MHz (one of GSSI's transmit frequencies) is 1565 MHz, which falls within the critical GPS L1 band. In order to address these concerns, the Commission should require that GSSI provide the LGPR's EIRP and out of band emission power up to 2 GHz in frequency. Additionally, GSSI should provide the Commission with the system's antenna pattern.

GPSIA recognizes that GSSI's waiver request is for equipment, in limited quantities, that will be used for evaluation purposes but that the ultimate intended use of the system is for widespread vehicular guidance. Given that this application does not fall under any of the designated GPR uses, we encourage the Commission to give further thought to finding a longer term spectrum home for GSSI's LGPR system.

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7 *Id.*

8 GSSI describes its Localization Ground Penetrating Radar ("LGPR") system as a lane-keeping facilitator that creates a basemap of road pavement subsurface features to enable autonomous vehicles to effectively stay in their lane even under poor visibility and inclement weather conditions. Request at 3-4. The Request notes that (LGPR-supported) autonomous vehicles can, *inter alia*, materially reduce injuries and fatalities from vehicular accidents, reduce traffic congestion and travel times, and reduce pollution and fuel consumption. Id. at 7-8.

9 Request at 3-4.

10 Request at 4.

III. ALL UWB WAIVER REQUESTS AND REQUESTS FOR WAIVER MODIFICATION SHOULD BE SUBJECT TO NOTICE AND COMMENT

GPSIA appreciates the opportunity to comment on the GSSI petition for waiver and strongly believes all proposals to operate outside the UWB rules, whether via petition for waiver or request to modify an existing waiver, should be subject to public scrutiny and input. In the course of the past year, Proceq[11] and Zoll[12] have both filed requests for UWB waiver modification and urged the Commission to bypass the notice and comment process. Proceq claims that its device has undergone only a "minor, evolutionary" change, that it has tested the device to ensure compliance with emission limits, and that public notice would burden the Commission with reviewing "repetitious industry filings."[13] Similarly, while Zoll has since modified its petition, the company initially urged the FCC to bypass the notice and comment process, claiming that public notice would only serve to delay approval and marketing of its device "as the usual industry 'watch dogs' file repetitive and threadbare objections to all such waiver requests."[14] While GPSIA understands these petitioners' desire for expeditious market entry for new products, the critical and far-ranging uses of GPS, the painstaking public process underpinning the establishment of the UWB rules, and the demonstrated value of public input require providing interested parties an opportunity to comment.

The Commission's UWB rules are a product of a thorough and rigorous public process in which the Commission and other government and commercial stakeholders from all perspectives participated. The FCC initiated a proceeding in 2000 to assess the proposed unlicensed operation of certain products

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11 *Supra*, n.2.

12 *Zoll Medical Israel Ltd. Petition to Modify Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, (filed December 26, 2018) (hereinafter "*Initial Zoll Request*").

13 *Corrected Proceq Request*, pp. 3-6.

14 *Initial Zoll Request*, pp. 7-8. In the corrected version of their request, Zoll removed all such language and no longer takes a position on whether the FCC should subject its petition to notice and comment.

incorporating UWB technology.[15] Recognizing that the wide bandwidth intrinsic to the operation of UWB devices could result in transmission of intentional emissions into restricted frequency bands used for safety of life purposes, such as the GPS bands, the FCC requested comment on the impact of UWB devices on GPS.[16] The record in that proceeding is replete with discussion of the likelihood that UWB transmissions in GPS spectrum would increase the noise floor and decrease the value and reliability of existing services,[17] the need for meaningful emission limits and associated measurement procedures to provide full protection to GPS and other safety-related services,[18] and the results of technical tests conducted to evaluate interference potential from wideband sources and to determine the UWB emission levels necessary to prevent interference to GPS operations.[19]

As a result of this painstaking rulemaking process, in 2002, the FCC amended Part 15 to permit UWB operations,[20] but only subject to specific operational restrictions, including emission limits designed to protect radio services such as GPS.[21] The rules reflect years of technical analysis and the careful balancing of competing interests and use cases. The public interest would not be served if these important protections were abandoned through a non-public waiver process.

Unless requests for waiver of the UWB rules are subject to public notice and comment, the Commission will not have the full benefit of the valuable perspectives that can bolster the public record and

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15 *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, Notice of Proposed Rulemaking, 65 Fed. Reg. 37332 (2000) ("*UWB NPRM*"); *see also Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, Notice of Inquiry, 63 Fed. Reg. 50184 (1998).

16 *See UWB NPRM* ¶ 29.

17 *See* Comments of U.S. GPS Industry Council, ET Docket No. 98-153, at 3 (Sept. 12, 2000).

18 *See id*. at 41-47.

19 *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, First Report and Order, 17 FCC Rcd. 7435, 7461 ¶ 71 (2002) ("*2002 UWB Decision*").

20 *See id.*, 17 FCC Rcd. at 7444-45 ¶ 21.

21 *See id.*, 17 FCC Rcd. at 7437-38 ¶ 5. The FCC further amended Part 15 of its rules in 2004 to provide greater flexibility to UWB technologies, but it left intact the protections for GPS. *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, First Report and Order, 19 FCC Rcd. 24558 (2004).

inform the Commission's decision-making process.[22] Absent the public notice and comment process, GPS services may be at put at risk without providing the Commission with an opportunity to learn from stakeholders of concerns or recommendations for solutions.

IV. UWB RULE WAIVER PETITIONERS CAN AID THE COMMISSION IN ASSESSING COMPATIBILITY BY PROVIDING REQUIRED TECHNICAL INFORMATION AT THE OUTSET

GPSIA supports greater efficiency in the administrative process to the benefit of all stakeholders and the Commission. In the spirit of advancing that interest, GPSIA points out that there is certain technical information that the Commission should always require from parties seeking a waiver of the UWB rules, which is as follows:

Required Parameters:

i. *Equivalent Isotropic Radiated Power ("EIRP")*

ii. *Out of Band Emission power up to 2 GHz in frequency* (particularly spurious emissions and harmonics)

iii. *Transmit waveform, including frequencies, dwell times, modulation*

iv. *Antenna pattern*

v. *Operational orientation*

In assessing the compatibility between a proposed UWB system and a GNSS receiver, the parameters EIRP and OOBE along with the physical distance between the UWB and GNSS devices are used to estimate how much RF power the GNSS receiver will see at the frequencies of interest. The antenna pattern and operational orientation can be used to refine that estimate. The transmit waveform is needed because some waveforms cause more degradation to GNSS receiver performance than others. For instance,

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[22] While Proceq and Zoll may perceive notice and comment as an unnecessary process, the Commission's prior experience with such waiver requests would counsel against foregoing stakeholder input. Proceq admits that in the Kyma Medical proceeding "one party encouraged the Commission to obtain additional technical information from Kyma, which Kyma supplied." *Corrected Proceq Request*, n. 6. Kyma is Zoll's predecessor in interest. Proceq also cites to a separate prior waiver request proceeding (Curtiss-Wright), and acknowledges that two parties filed oppositions to that petition. Id.

GNSS receivers can often maintain tracking in the presence of low duty cycle pulse interference, but would be unable to track at all with a continuous interference source of the same power.

These data points are the minimum technical requirements needed for the Commission to assess whether a proposed system will adversely affect GNSS reception. If a party seeking a waiver does not disclose such information, it should expect that the Commission will request that such information be provided. The Commission should discourage requests for waivers of the UWB rules that do not provide this basic information and decline to process such requests unless and until such information is provided.[23] Establishing a set of information that the Commission will require to assess UWB waiver requests will allow applicants to significantly reduce the likelihood of follow up information requests from the Commission.

V. CONCLUSION

GPSIA appreciates and supports advances in autonomous vehicles and the promise that GSSI's LGPR device holds for self-driving cars. GPSIA also appreciates GSSI's good faith efforts thus far to work towards a solution which protects incumbent operations. However, the record currently before the Commission fails to address material questions, including how LGPR operations will impact critical GPS services. The GPSIA therefore respectfully requests that the Commission defer any action on the requested waiver until GSSI provides the Commission with complete technical and operational information regarding its product, including the information discussed herein, and it otherwise ensures that GPS operations are adequately protected.

[23] GPSIA acknowledges that there may be instances in which parties seeking a waiver do so for technologies under commercial development and thus may have a legitimate need to keep information confidential. In those circumstances, the Commission process could provide for appropriate nondisclosure agreements tailored to protect confidentiality while sharing information necessary to assess potential interference impact.

More generally, all UWB waiver and waiver modification requests should be subject to public notice and comment and the Commission should not process requests for waivers of the UWB rules unless or until the requesting parties provide the aforementioned technical parameters.

Respectfully submitted,

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